The Science Teacher

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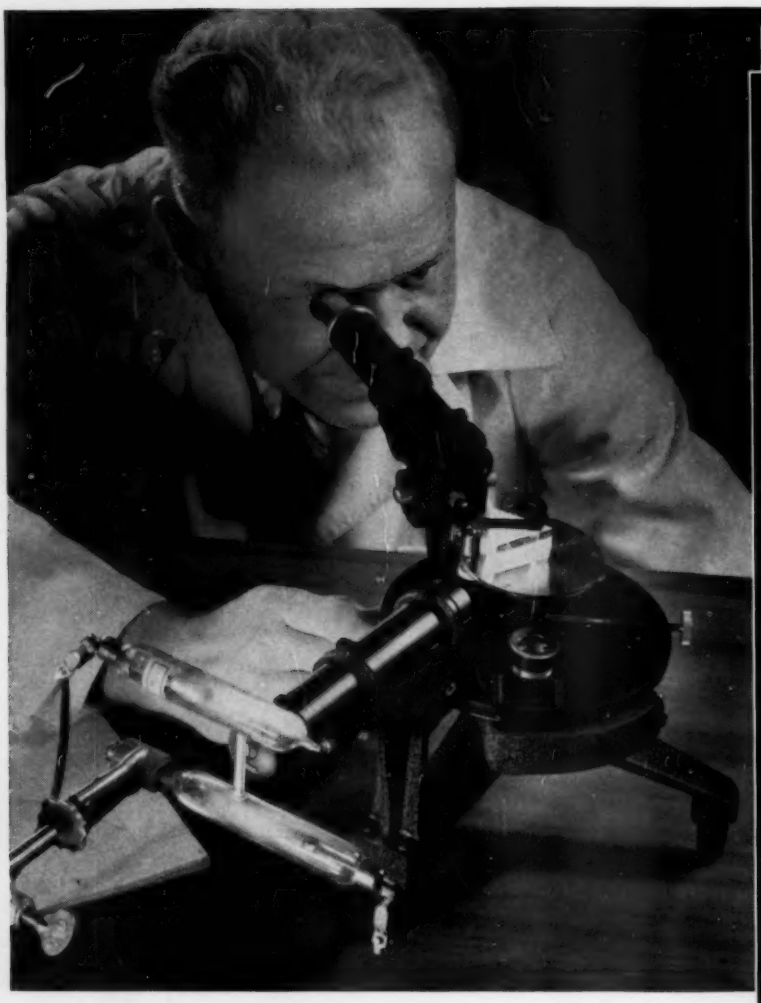

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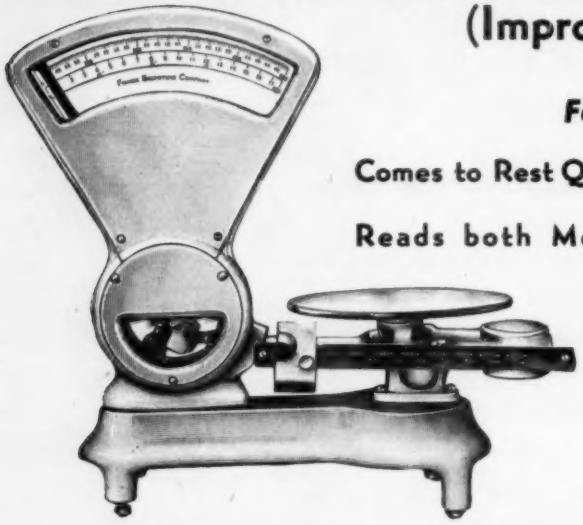

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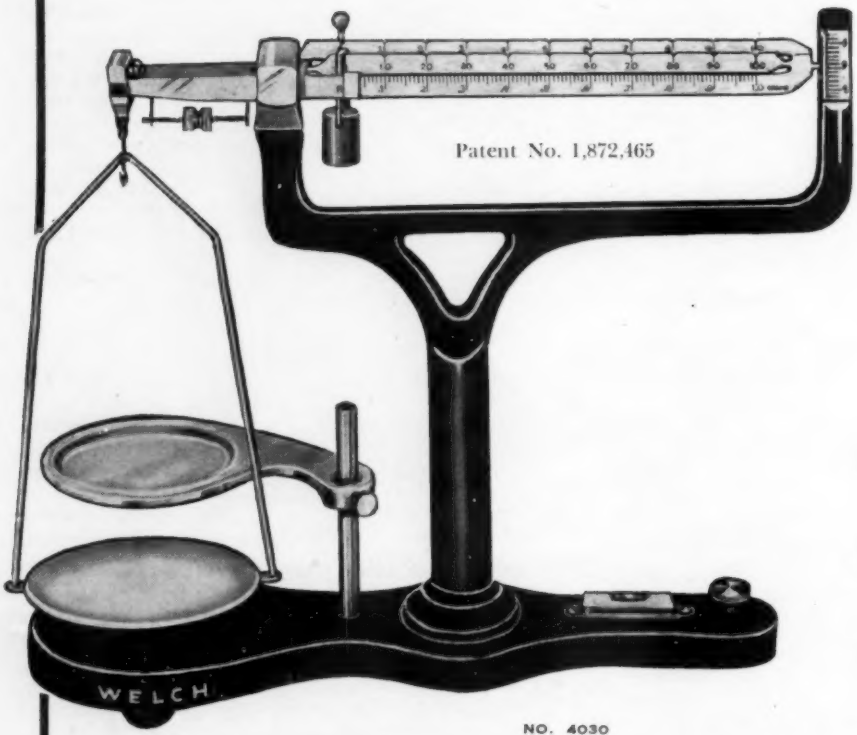

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VOLUME XII FEBRUARY, 1945 NUMBER 1

Military Hygiene II

WILBUR F. DOUGLAS

Polytechnic High School Long Beach, California

The first article on Military Hygiene was presented in the December, 1944, issue. It gave information which a soldier today should know for protection against common communicable diseases.

In this article Mr. Douglas gives the facts about alcoholism, sex hygiene, and mental hygiene that he presents in class to students who expect to enter military service.—Edtior.

Alcoholism in the Armed Forces

ALCOHOLISM is a real military hazard. It is no exception to the rule that many health hazards of military life are due to the necessary overcrowding of small areas. The drinking of alcoholic beverages is often an unfortunate by-product of normal gregariousness and the social pressure of the crowd. The average alcoholic begins his drinking in order to please some other drinker and appear to be a "good fellow". What the inexperienced person does not know is that instead of losing the approval of others, one usually gains the respect of his comrades by adhering to a more sensible course.

Because of political and economic pressure our government, through the Army and Navy departments, is doing little or nothing to protect you against this hazard. Therefore you must do your own thinking and make your own decisions with reference to this problem.

MARSHALL Petain ascribed much of the responsibility for the fall of France to alcoholism in the French Army. It has been stated that the per capita consumption of alcoholic beverages in France at the time of the French collapse amounted to two and one-half quarts *per week.*

There is plausible significance in the fact that the Japs chose early Sunday morning for their sneak attack on Pearl Harbor.

Some physiological effects of alcohol have been grossly exaggerated in the past. Medical men disagree as to the extent to which even long continued drinking habits may contribute to sclerosis of the liver, vascular deterioration, and kidney malfunction. But there is general agreement that alcoholism predisposes to pneumonia.

The real danger in alcohol is psychological. Its greatest affinity is for nervous tissue. Alcohol has an initial narcotic effect on the inhibitory and control functions. The nervous functions are affected in the reverse order to that in which they evolved. In other words, this narcotic first robs a man of those qualities that distinguish him from a mere animal. Your instructor once sat for four months as a member of a court martial. It was our unpleasant duty to try soldiers for offenses that in almost all cases were directly attributable to alcoholism.

Although it usually requires several years of drinking to produce confirmed addiction, I have seen soldiers and officers whose entire usefulness was destroyed in a few months. Such rapid deterioration is an illustration of the great difference between individuals in their tolerance for alcohol. *The efficiency of no one is increased by its use, and the effect on many is devastating.*

Drinking under the stress associated with military life is an escape mechanism. As such it is unwise and disintegrating to the personality. Abstinence is the road to military efficiency. "The morale which comes out of a bottle is not the morale to put into a battle."

Sex Hygiene

SEX hygiene is closely allied to the alcohol problem. A great majority, perhaps 90 per cent, of venereal infections are contracted after drinking. This is true in military as well as in civilian life.

It is perfectly normal for you to be attracted by the opposite sex. These desires are normal in all healthy men. Most of you have been reared in good homes where you have been taught respect for womanhood. If you are normal, you look forward to the establishing of your own home.

But military life separates such men as you from the normal contacts of home and postpones the time when you can satisfy the normal mating instinct in a decent manner. For millions of men this means a choice between continence and a resort to prostitutes. Ever since there have been armies, they have been followed by droves of loose women and other human dregs, ready to exploit and feed on the animal instincts of young men.

CONTRARY to statements you may have heard, there is absolutely no medical evidence that continence in any way harms the individual. Repression, contrasted with self-control, consists in denying that you have these instincts and desires. They are just as normal in you as in any other animal. Perhaps you will understand my meaning better after reading the following statement made by a physician who has made a special study of this problem:

"*As long as civilization will endure sex will have to be controlled,* and only irresponsible imbeciles can believe that one can run riot with sex. Because sex repression plays a part in the neuroses it does not imply that sex license spells perfect health. We maintain that sex was restricted by the struggle for existence; in civilization society found it expedient, for very good reasons, to reestablish those restraints that were abrogated through the tightening of the struggle for existence. Without restraint or control there could be no sublimation and hence no c u l t u r e d state. *Enough of that sex freedom asininity!* On the other hand repression means ignoring the very existence of the sex instinct which is equally foolish."*

WHAT this means is, in brief, that one of the foundation stones of the civilization for which we are fighting is the ability *and the* and welfare of others as a curb on our own desires and instincts.

The fact that many women and girls do not deserve respect in no way eliminates your responsibility at least to respect yourself. For promiscuous sexual relations are degrading to both parties. One cannot escape the loss of self-respect that results from the violation of a code which derives from centuries of racial experience. I have witnessed in some of my former comrades the acute remorse that may follow sexual lapses on the part of essentially decent fellows. The pressure will be severe, and it takes a man to stand against it.

The following quotation is from a talk made to the men of his command by a young officer of the Armored Forces, a graduate of this high school, who was later killed in the Tunisian campaign while voluntarily carrying out a dangerous mission, rather than risk the life of one of his men:

"I know that you are lonely at times, men, because there are times when I look off into the clouds and think dearly of home. I know that you might not come back from this war, because I am in it with you, and I know what it's all about. But let us not use this loneliness and this war for an excuse for our own degeneration. If we do take advantage of these two factors and behave like animals, we have already lost that thing we are fighting for. We have lost the right to be free and to enjoy the progress of civilization, for we are standing civilization back hundreds of years."

May I recommend for your thoughtful reading an article: "The Case for Chastity" which appeared in the *Readers Digest* for August, 1937, and was later published in that magazine's anthology of their best articles of the past decade.

THE VENEREAL diseases as a miliary problem are largely a product of prostitution. From the standpoint of hygiene this is the most important phase of this topic. No prostitue can be in business very long, usually only a matter of hours, without becoming in-

*A. A. Brill, *Sex and the Physician,* a chapter in "Twenty-four Views of Marriage", edited by Clarence A. Spaulding, Macmillan, 1930.

fected with either or both syphilis or gonorrhea. The so-called "charity girl" can be even more of a menace in this way, since she is never subject to any compulsory medical examination.

Syphilis has been said to destroy the individual while gonorrhea does the same to the race, since it is responsible for a great deal of sterility. The former disease is caused by a minute animal parasite that can get into the body through any moist membrane or the slightest abrasion or scratch in the skin. It is so short-lived outside the body that its transmission is almost invariably by direct contact, although it is not uncommon for a community drinking cup, flask, or whisky bottle to transfer the spirochetes from the mouth lesion of one individual to his companions.

Syphilis is thought to have been introduced into Europe by the returning sailors of Columbus, who had contracted it in the West Indies. Within a generation it was spread over Europe by armies and had a virulence not seen since, although it has remained a major scourge throughout the world during the intervening centuries. Only comparatively recently have salvarsan and other arsenical drugs offered the possibility of eventually eliminating this ancient enemy of mankind.

THE PERSON suffering from syphilis is a highly dangerous individual, and yet about five per cent of the population have it. Society has not yet supported the compulsory isolation and treatment of cases of syphilis, probably because of the usual origin of the infection. During the tertiary or chronic stage of untreated syphilis, there may be a long period, perhaps years, when there are no visible symptoms; and a false sense of security is engendered. All the time the deadly microorganisms may be doing their destructive work in the central nervous system, the arteries, or almost any other part of the body. About fifteen per cent of all insanity has a syphilitic origin and the "great deceiver" may be responsible for almost any human disability.

Gonorrhea is a pus infection of the genito-urinary system and is about twice as prevalent as syphilis. It is a much more serious disease than many uninformed persons believe. Much of the blindness in the world is caused by infection of the eyes at birth. If untreated, the disease becomes resistant to later cure. The new sulfa drugs promise much more effective control of gonorrhea.

In World War I venereal disease was contracted by 430,000 men in our armed forces. This was in spite of the wide-spread use of chemical prophylaxis. The latter is about 90 per cent effective when used promptly after exposure.

THE Surgeon-Generals of the United States Public Health Service, the Army, and the Navy, together with our military leaders, are doing what they can to reduce prostitution and promote clean living on the part of service men, through a program of educational films and lectures. Congress has enacted a law making prostitution a federal offense within a reasonable distance of military establishments. But this law has been invoked in only one instance that has come to my attention.

The sum of the matter is that your own safety and your moral, mental, and physical welfare rests largely with yourself. If the ethical motive means nothing to you and you are destined to be one of the 15 per cent, as estimated by the Army, who are incorrigible in this respect, the least you can do is to avail yourself of all possible protection against infection.

The only wise and decent decision to make is to wait for sexual satisfaction until such time as you can bring home a woman of whom you can be proud. Ask yourself what kind of a man you will be when you come back to your own women folks. *Also would you want someone else to treat your sister, mother, or sweetheart the way you act toward other women?*

Mental Hygiene

MILITARY life has its *mental hazards* also. More care is being taken in this war to avoid the induction of men with unstable nervous systems, who would be the first ones to "crack up" under the strain of active service. But at best, the stress will tax the soundest of personalities. If you are to come back to civilian life fit to assume a useful place in

Continued on page 34

Editorial and News

Conservation Must Not Fail

Locking the door after the horse is stolen, one common American pattern of action, unfortunately may well apply to present methods of dealing with our national resources. We do too little about it and do it too late for the common good.

The press is currently reminding us that our richest iron deposits may be depleted in five to six years and our copper in ten to twelve years at the present rate of consumption. But even so, no one would say that the demands of national defense should not be met. However, for civilian use, we are plainly faced with the immediate necessity of a better planned use of our mineral reserves.

IN THE USE of timber we are not only thinning our forests but are currently neglecting in some areas to provide for a replacement of the timber being cut. It takes many years to grow a Ponderosa pine or even a substantial oak. If we do not plan our timber reserves now, some of the on coming generations may find themselves short of this necessity. Further, it may prove wishful thinking to expect the chemist to provide a substitute sufficient in quantity and low enough in cost.

In the matter of oil we are draining our reserves at a prodigious rate. The supply is limited and cannot be replaced. We soon shall be among the greatest oil importing nations and we already do import much oil. From one of the great "have" nations of the world we are slipping into the class of "have nots". We shall likely have to depend on Canada, Alaska, Siberia, and China for minerals and timber. This is not a pleasant picture should the time ever arise again for national defense on a major scale.

WHAT CAN be said of minerals and timber may also be said of plant and animal life and also soils. It is time we face the facts intelligently and present a planned program of education that will produce an actively interested citizenship, one that will insist that our natural resources be rightly used.

We are inclined to agree with Dr. Henry B. Ward of the University of Illinois, president emeritus of the Isaaz Walton League, when he states, "Long experience in educational work of different types has led me to feel that conservation has not received the position and emphasis in the school program which its importance demands. This is a problem which must be solved by teachers and leaders in education and not left in the hands of other interests".

NOW THAT consumer education in all areas, including science, is to the fore in current studies to make our school curriculum more functional, it would appear wise to make conservation, a natural consumer problem, one of the major parts of these studies. It should deserve major attention in curriculum planning. Conservation of animal life, of plant life, of minerals, and also of human energy fits into the school curriculum as vital and functional on all levels of learning.

A citizenship schooled in conservation and actively interested in the common good could halt this great American tragedy of permitting private interests to exploit our natural resources, often in a wasteful manner, converting them into a gold reserve, and then leaving us stripped of the basic materials for production which we need for future prosperity and national safety.

SOME progress has been made in interesting the public in conservation. Certainly much credit for developing a consciousness of the problem should go to such organized groups as the Isaak Walton League, The National Wild Life Federation, and the Friends of the Soil. But the final success in developing an intelligent conservation minded citizenship must come chiefly through education in the schools.

In our next issue—"How the Teaching of Biology Can Make Conservation Work".

N. S. T. A. at Work

PHILIP G. JOHNSON
President of the National Science Teachers Association

Your association is developing a report on Consumer Science. A number of science teachers have submitted drafts of manuscripts as assistance to the national committee. A tentative report will be ready about the time you read this announcement and you may have an opportunity to criticize this preliminary document in order to guide the committee in the preparation of the final report.

Write a card to Mr. Nathan A. Neal, Chairman Consumer Science Committee, Board of Education, Cleveland, Ohio and ask him for a copy if you would be willing to assist the committee by giving constructive criticism.

Sustaining Memberships:

A generous number of active members have decided that the National Science Teachers Association is their hope for the continuous advancement of science teaching in the years ahead. They have realized that an active membership at $1.00 will not make much leadership work possible so they are sending in an additional $4.00 and asking to be classified as *Sustaining Members.* Many of these Sustaining members are also giving much time and thought to the association by serving as officers and directors.

NOW IS AN ideal time to join this group of Sustaining Members because it is easier to develop a strong program with the additional revenue and it is also easier to win the support of Foundations and commercial groups when there is concrete evidence that the science teachers themselves are doing a lot to demonstrate their faith in the new association.

Think it over and perhaps you can interest some of your associates in active membership while you join the growing rank of Sustaining Members. Send the dues you collect along with names and addresses to Mr. Norman Jones, 5073a Mardel, St. Louis 9, Missouri.

Affiliations:

Has your local group of science teachers affiliated with the National Science Teachers Association? A number of national, state, territorial, and local groups have officially approved affiliation. These include: The Division of Chemical Education, The Association of Science Teachers of the Middle States, The Puerto Rico Science Teachers Associaiton, and many others.

There is no charge for affiliation if your group has less than fifty members and only $2.00 for larger groups. However, the president or secretary must notify the president of the national association concerning their desire for affiliation.

Each affiliated organization may name one or more consultants to national committees, may propose candidates for office, and YET each affiliated group retains complete autonomy.

A certificate of affiliation has been prepared and will be issued to each affiliating group. For greater strength, unity, and influence, you should see to it that your group, whatever be its number of members or area of service, takes the formal steps necessary for official affiliation.

Suggestions for Scientific Health Teaching:

Health teaching has been made a requirement for all high school students in New York State. Science teachers saw a real hazard in having this teaching done outside of science classes. The danger to biology was especially great. New York State Science Tachers Association met this hazard with courage and action. The result is that biology has been approved as a perfectly satisfactory way to satisfy ½ of the requirement.

Now this State Association has decided to implement this health teaching by issuing a list of suggested activities. They believe that many other science teachers are eager to share ideas relating to scientific health teaching and they have asked the National Association to appoint a committee to work with them on a national report.

Would you be willing to help such a committee? Would you be willing to criticize the

Continued on page 42

This and That

NORMAN R. D. JONES

Vice President of the National Science Teachers Association

Mr. A. L. McLendon Jr., who was President of the Georgia Science Teachers Association and also our State Director, has returned to Georgia after a brief sojourn in Louisiana. He has consented to act as State Director again and it is hoped that he will re-vitalize the Georgia group.

The Tennessee Aeronautical Teachers Association was recently formed and elected Mr. Jacob Shapiro as Chairman. It is hoped that they will soon become an "Affiliated Group" from reports received from them.

Jack Hudspeth, a former president, is still busily engaged in the preparation of instruction materials at Randolph Field, Texas.

Miss Anna E. Burgess, Ohio State Director, received a promotion recently from Elementary School Principal to Supervisor of Elementary Science of the Cleveland Schools.

Lt. Ralph C. Bedell, U. S. N. R. formerly of the University of Nebraska, sent in his membership renewal recently. He is on the Staff, (Chief Naval Air Training) at Pensacola, Florida.

Mr. Joseph S. Kluchin, Louisiana State Director, received a nice promotion this year, being transferred to the principalship of one of the largest high schools in New Orleans.

Mr. Homer A. Clark, who has served very ably as Detroit and S. E. Michigan Area Director for the past several years, asked to be relieved, as his duties in his new position (Assistant Principal of the Pershing High School) would not permit him sufficient time to carry on this work to his satisfaction. He secured one of the teachers from his school, Mr. Earl Debus, as his successor.

Dr. Charlotte Grant, Indiana State Director last year, received a promotion in accepting the department chairmanship at the Oak Park (Illinois) High School.

H. F. Metcham, formerly of Jersey City, is now in the service of his country. He renewed his membership in N. S. T. A.

100% Memberships

ARE ALL science teachers in your school members of N. S. T. A.? If so send to the membership chairman the name of your school and of all the teachers so that each of you can be sent one of these fine 100% membership cards prepared by our North Central Area Vice-President, Mr. Fred W. Moore. (Incidentally these cards were printed in his school shop). *Be sure to secure yours immediately.*

New State Directors

We are glad to welcome our new state directors:

S. E. Arkansas, Curtis Love, High School, Pine Bluff.

District of Columbia, G. M. Rawlins Jr., Woodrow Wilson H. S., Washington, 16.

Chicago (Illinois), Alexander Brainer, 1143 W. Huron St., Chicago.

Indiana, Mr. Gordon B. Brankle, Ben Davis H. S., Indianapolis.

S. E. Michigan, Earl S. Debus, Pershing H. S., Detroit.

New Mexico, Mrs. Gladys Nesbit, High School, Springer.

North Dakota, Paul T. Nerhus, High School, Fargo.

Wisconsin, Harold Wierks, Shorewood H. S., Shorewood.

Wyoming, Mr. A. J. Conrey, 1419 Kearney St., Laramie.

Lament of a Membership Chairman

WHAT OR how is *that* name or city spelled? We try to do our best but do make mistakes so if you find that your name or city is misspelled or the street number is incorrect please use a penny postcard to notify us so we can correct it. Incidentally the "please print" on the membership blank has "improved our ability" to get them right.

Changes of Address

Please report promptly all changes of address to your membership chairman. 58 "1944" Yearbooks were returned due to address changes. At present we have been able to trace about half of these.

Failure to Receive Publications

Two letters gave contrasting viewpoints on failure to receive our publications: *One*—I did not receive all of your publications last year but am enclosing my 1944-5 membership and hope to receive all this year; the *second*,—I do not care to renew my membership as I received no publications last year. It so happened that in the 2nd case 2 names, one directly following the other, were similar and the typist had inadvertently omitted it in preparing the mailing list.

Please notify us if you have not received your publication by the 20th of the month following the scheduled publication date. The Science Teacher dates of publication are December, February, April and October. It is only as we are told of our mistakes that we can correct them and make adjustments (incidentally they are relatively few).

Merger

Many expressed the sentiments which are quoted from the letter of Byron F. Alexander of Boulder, Colorado, in which was enclosed his 1944-5 membership; "I am glad to see this merger of science teacher organizations because I feel that it will make a more useful organization."

Membership Aid

The response to the renewal letter has been excellent to date. A characteristic letter received from several (which indicates the interest in the organization) is as follows: "I will be glad to circulate information about the N. S. T. A. to others in this area, if you will send me the materials. I am sold on your association".

Another:

"I am enclosing the 2 blanks from the renewal letter plus my own membership. Will you please send me more blanks as there are other excellent prospects here".

Recent Affiliations

Two recent "affiliated groups" have been reported. Sr. Lebron Ortiz of Guayama, Puerto Rico, who is President of the Puerto Rico Science Teachers Association, wrote that they were now an "Affiliated Group." This closer relationship should prove beneficial to both organizations. 41 memberships have been received from Puerto Rico to date and Sr. Ortiz assured us that more would be sent in.

Action was taken to become an "Affiliated Group" at the meeting of the Arkansas Science Tachers Association held the second week in November under the direction of Dr. Charles U. Cross, State Director and Mr. Curtis Love, Southeastern Area Director, 38 memberships were securd at this meeting.

Meetings

MANY OTHER enthusiastic science meetings have been reported. Meetings are of vital importance for the exchange of ideas (both inside and outside of the meeting room) in these rapidly changing times.

The Central California Council of Science Teachers (an Affiliated Group of the N. S. T. A.) inaugurated several forward looking plans for attacking some of our problems. 61 memberships were secured at their October meeting.

Mr. Ellis Jeffery, State Director of Nebraska, sent in 16 memberships from the meeting of the Lincoln District.

Dr. H. A. Webb spoke at several meetings in Tennessee and Kentucky last fall. At each meeting he presented the work of the N. S. T. A. which resulted in several memberships.

The New Jersey Science Teachers Association, "An Affiliated Group" held their fall meeting at the McAlpin Hotel in New York City. 30 memberships were secured.

The Missouri Science Teachers Association, an "Affiliated Group" held an interesting meeting at Kansas City the first week in November. The revised constitution was adopted at this meeting. The forward looking program incorporated can do much for science in that area. 33 memberships were secured at the meeting.

THE ILLINOIS Association of Chemistry Teachers "An Affiliated Group" held a brief meeting in conjunction with the Chemistry Section of the Central Association of Science and Mathematics Teachers. Several memberships were reported.

The N. S. T. A. appreciated the splendid co-operation of the Central Association in connection with the Consumer Science Education Meeting held on Friday evening, November 24.

Gardening as a School Science Activity

PAUL B. YOUNG

School Garden Supervisor, Board of Education, Cleveland

THE nationwide Victory Garden campaign of the past three years, which is to be continued in 1945, has brought gardening into focus as a school activity. It is recognized as a war program in which school pupils and the school organization can take an effective part.

However, gardening is an activity so clearly educational for youngsters, so obviously of value to those who engage in it, that it deserves a part in every school program, even if its products met no patriotic or emergency needs.

Schools, even in wartime, are operated for educating boys and girls, and they cannot afford to overlook this in the conduct of their war activities. Gardening can fully qualify on this basis at the same time it is returning maximum values in food production. It should receive more attention than it does in the schools of the nation.

Character training, work experience, wider social appreciations, and an opportunity for creative expression are all afforded by gardening conducted as an educational activity. All are major objectives of education in general.

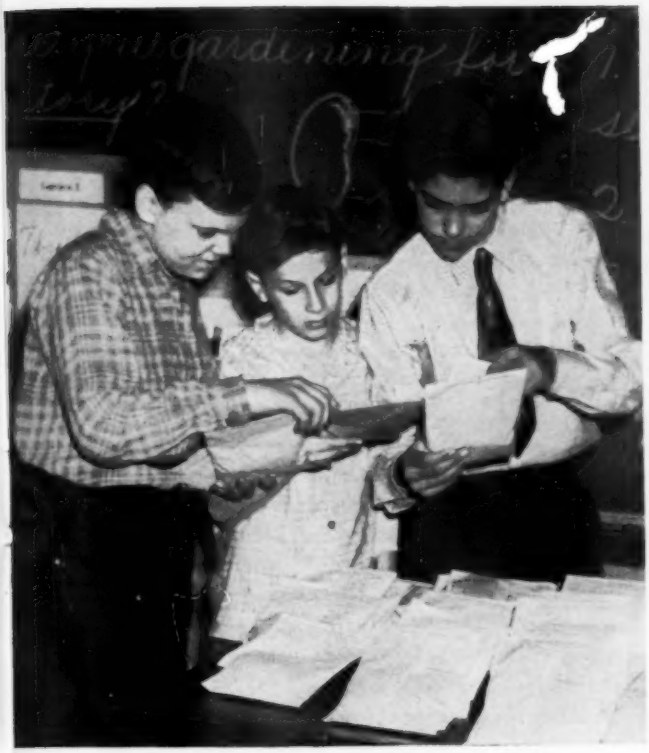
AS A LABORATORY for science, the garden has tremendous resources. Actually the garden is more than a laboratory in the school sense of the word, for its situations, experiments, reactions and results are not artificial but carried out in real life terms. Gardening may be a most valuable means of tying scientific principles to practical life realities and thus make them meaningful to the pupils.

Conversely, science is the source of the basic knowledge and skills of gardening. Successful gardening requires instruction which science-trained teachers are best equipped to give.

It seems obvious that gardening as a school activity belongs in the science field, and can contribute something to the science program of which it is a part. It likewise substantially promotes attainment of the general objectives of education for which schools are conducted.

Following are some suggestions regarding the organization and conduct of a school gardening program. They envision it as a program to promote the education of the children who participate, as well as to produce food for Victory. They have grown out of

Garden instruction building, hotbeds and coldframes at Harvey Rice School Garden, Cleveland



Seed collections for specific gardens simplify problems for teacher and pupil.

almost twenty years of school gardening experience in Cleveland.

Gardens at School or at Home?

SCHOOLS with adequate areas of good garden soil available may consider the desirability of establishing a school garden tract where pupils can have individual garden plots in a group, or grow vegetables for the school lunch, on a communal plan. Such an enterprise entails problems of soil improvement, soil preparation, protection from vandalism, providing equipment of various kinds, and summer supervision. A considerable budget is necessary for a school garden tract of this sort and success is, to a large degree, dependent upon the ability and experience of the person in charge. The project is bound to be conspicuous, so that success or failure alike are very definitely advertised to the community.

However, those with experience in school gardening are pretty well agreed that it is wise for the school or school system inaugurating a gardening program to start with a program of school-sponsored home garden projects rather than to attempt a group garden tract. The home program obviates most of the problems mentioned above, because the gardens of the boys and girls are at their homes. School responsibilities and needed facilities are brought down to their lowest terms. A home garden program is feasible in all kinds and sizes of schools in all sorts of communities, for they all draw their pupils from homes, and it is a rare community which is not situated on soil of some degree of productivity, to which most of the homes have some access.

The detailed suggestions which follow are most applicable to a school-sponsored home gardening program. Such a program has been in operation in Cleveland for the past 13 years.

Facilities and Personnel Needed

No special school facilities in the way of

All they take out of the garden is not in their baskets.

rooms, buildings, or land are required for a successful home gardening program. If space is available to start a small demonstration garden as a feature of instruction, it will be valuable, but need not be considered essential. The ordinary laboratory type classroom with tables, such as is used for science instruction, makes a desirable place for instructional indoor gardening activities, but even the old fixed-seat type can be used if need be. A place for growing plants in the school is, again, not essential, although if available it will enlarge the possibilities somewhat.

ANY EARNEST and capable science teacher with some practical garden experience and a genuine interest in gardening, can organize a gardening program for a school or a school system. Some one person of this sort as an administrator and coordinator is essential. Any teacher undertaking it must have sufficient time freed from other duties, if an effective job is to be done.

General science teachers can give the needed instruction as part of their regular course of study. This prepares all pupils for a practical home project in gardening if they wish to undertake it. Science teachers, also, are the logical persons to do the summer supervision so necessary to success.

Helps and Supplies

PROBLEMS that loom large when undertaking a school gardening program are (1) how to organize it effectively, (2) how to teach the children what they need to know, and (3) how to provide the needed supplies of seeds, plants, etc.

In an effort to help with the problem of organization and instruction, the Garden Education Department of the National Education Association, before it became the Garden Section of the National Science Teachers Association, sponsored the publication of material for school use. In 1942 *Elementary Garden-Graphs* was published as an elementary pupil text, with an accompanying *Teachers' Manual* giving organization suggestions in detail. *Advanced Garden-Graphs* and its *Teacher's Manual*, for junior high grades, was published in 1944.

The manuscripts for these booklets were read and approved by a committee of the Garden Education Department before publication. They have been printed inexpensively

Raising seedlings for pupil gardens as a class project.

Gardening to improve the school property.

and are useful as classroom texts, well within the most modest budget*.

When seeds and plants, for definitely specified gardens, can be provided the children who enroll, it increases the proportion of successful gardens greatly. Seeds may be purchased in bulk and packeted for pupil use by the boys and girls themselves. This has educational possibilities if time and supervision are available, but is something of a "chore" for those in charge.

IT IS POSSIBLE to purchase collections of seed all ready to distribute to the children who have signed up. These collections have been prepared to plant the garden plans suggested in *Garden-Graphs*. They are enclosed in a collection envelope which bears a copy of the garden plan as well as instructions for planting and care. Cost is very low*.

Needed vegetable plants can usually be bought in quantity from a local grower, at wholesale prices and distributed to the children, at school.

Some Fundamental Ideas

Embodied in the material just mentioned, are the ideas which experience has demonstrated are fundamental to success. Some of them are important enough to be emphasized here.

Specific Garden Plans. The keystone of success with a children's gardening program, whether for educational success or success in production of important food, is the provision of definitely planned and suitable gardens for children to grow, and the furnishing of the needed seeds and plants at the proper time for their use. This insures gardens of the right size and content, and insures their being planted at the right time. Parents know what space must be provided for their child's garden, and can help in supervising its planting and care, because it is definite. School instruction can be given because the work to be done by the pupils is definitely outlined by the garden plan.

Elementary Garden-Graphs includes two definite children's Victory Garden plans and a flower garden, which have been used with marked success by thousands of children in Cleveland. To meet the necessary qualifications of a child's garden, they are small, simple in layout, and contain only crops that do reasonably well with the rather inexpert care children can give.

Enrollment. Except in the far south March is the ideal time to present the Victory Garden idea to school pupils and to enroll those who wish to participate in the program. Explain the plan to them in classroom or assembly. A mimeographed or printed circular for them to take home to their parents, setting forth the details of the program is desirable. Enrollment cards can be printed or mimeo-

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*Available from Garden Reviews, Inc., 415 Lexington Ave., New York 17, New York.

*Available from Templin-Bradley Co., 5700 Detroit Ave., Cleveland 2, Ohio.

Frequency Modulation and Its Place in Post War Broadcasting

A. JAMES EBEL

Chief Engineer, Station WILL — University of Illinois, Urbana, Illinois

Concluded from December issue.

FREQUENCY Modulation, largely at the insistence of its inventor, Major Armstrong, has thus far avoided these pitfalls. FM receivers must be made of highest quality components and use approved circuits before the manufacturer will be licensed to make receivers under the Armstrong patents. Thus, the sets show not only the inherent advantages of the FM system but also the result of high quality design and manufacturing. Realizing that the listener has paid a fairly high price for a receiver to hear high quality reproduction, the broadcaster has designed his programs on the same level. Many listeners have remarked that they think the best thing about FM is the programs. Whether or not the industry will be able to maintain the high standard under the pressure of competition is a question which must be left to the future. Certainly they have made a good start and should be given all the encouragement it is possible to give.

From the above discussion, one might arrive at the conclusion that there is no longer any excuse for the existence of an AM system of broadcasting. That AM broadcasting is not seriously threatened at the present time is due to several outstanding drawbacks of the FM system. The greatest of these is the limitation of the range of the FM station by the horizon. The low frequency AM waves are diffracted around the curvature of the earth's surface with little attenuation. The high frequencies are not so easily diffracted, and considerable attenuation takes place as the receiving antenna recedes beyond the horizon. By the use of sufficient power, it is possible to transmit over distances equivalent to three times the distance to the horizon. From the geometry of the problem, it is obvious that the distance to the horizon, and consequently the distance of transmission, will be a function of the height of the antenna structure above the surrounding territory. This has led to a real estate boom in mountain top property near populated centers. Most of the present day FM transmitters and antenna systems are located on mountains or on top of skyscraper buildings. In areas of the country where high places are readily available, the distance of FM transmission is very satisfactory. However, over a greater part of the country's area there are no such high places, and the transmission range is very definitey limited. It is this factor which makes it seem almost uneconomical to install an FM system in parts of the country where there are vast expanses of plains and very few, if any, skyscrapers. One solution to the problem is to relay the programs from one station to another, thereby overcoming the effect of the horizon. Figure 4 shows the operation of such a system which is in regular use at the present time. It will be noted, however, that this system is in a part of the country where the location of high spots is not particularly difficult. Such relays are possible only because of the extremely high fidelity of the FM transmission. A standard AM signal retransmitted the same number of times would become badly distorted and unpleasant to hear.

A SECOND drawback to the establishment of the FM system arises from the same condition that accounts for the fourth advantage listed above. That is to say, a complete change will have to be made in both transmitters and receivers. Broadcast stations, receiver manufacturers, and the average receiver owner all have an investment in the present system and are not willing to "junk" it immediately in favor of something new. Even if the system were theoretically perfect, this factor would retard its development.

Finally, on the debit side of the FM ledger are the careless listening habits of the average listener. Poor quality of reproduction isn't bothersome when the radio is used as an ac-

companiment to other activities. High quality demands attention and bothers those who would carry on conversation, read, or pursue other activities while the programs are being received. Gradually the American public is being trained to listen. The change is being reflected in the increased demand for serious music and in the demand for high quality record producing equipment. The acceptance of FM will follow this trend toward high quality.

WHAT WILL happen to FM and AM broadcasting in the future is largely a matter of conjecture. There are some factors in the present situation which point to future trends. There are in actual operation, as of December 1, 1943, 47 regular commercial FM stations and 6 educational FM stations. These are located in 17 of the 48 states with the greatest number in New York, Pennsylvania, Illinois, and Massachusetts. The educational FM stations are operated by the Boards of Education in New York, Cleveland, Chicago, and San Francisco, and by the University of Illinois and Kentucky.

The manufacturers of radio transmitting equipment to be used for broadcast purposes are all concentrating on the FM market. Whether this is because they feel that FM will replace AM after the war or because they see a fertile market here because there is now very little FM equipment in use is difficult to ascertain. It is true that hundreds of broadcasters and other interested parties have signified their desire to get into FM broadcasting after the war.

On the receiving side of the picture, it has been estimated that 500,000 FM receivers were sold before radio manufacturing for civilian consumption was halted. Every prominent manufacturer was either in production on FM sets or planning to go into production. Most of these sets were FM-AM combination receivers. The distribution of these receivers was concentrated in the metropolitan areas where there were several FM stations providing regular program services.

ONLY IN the educational FM bands has there been a lag of interest in the development of FM service. These frequencies, set aside for the exclusive use of the educational institution, provide the answer to the demands of education that more space in the broadcast spectrum be allocated for the purpose of educational programming. In the early history of AM broadcasting there were many colleges and even some high schools that owned and operated broadcasting stations. Either because they couldn't finance the operation of these stations or because they didn't know how to operate them successfully, the stations dropped out of the picture one by one. At the present time, non-commercial educational standard broadcasting stations are a rarity and are operated in general by the large universities and colleges.

After having lost many valuable frequencies to the commercial stations, largely due to its own neglect and short-sightedness, education in the early thirties started clamoring for more of the available ether space with very little success. Established commercial broadcasting enterprises could not be easily dislodged. Now once again history is repeating itself. The band set aside for education in the FM spectrum is the most desirable of all the FM frequencies and is capable of handling over a thousand FM stations throughout the country. Yet to date there are only six. This is a serious situation and one that demands immediate action in the part of educators. It may be true that in some localities FM frequencies are not as valuable as AM frequencies, but education may well take a lesson from the radio amateur. When he was pushed into the "worthless" short waves, he set about to develop them and did develop them until they now provide the most valuable medium of point to point transmission known. The use of the FM frequencies also needs development, but if education waits for the commercial broadcaster to develop them there will be no room left for education's use.

THE QUESTION this paper set out ot answer is still unanswered and will probably remain unanswered for the next five years. It may be seen that there will be a definite trend toward increased FM service. However, there is nothing that points to decreased usage of the AM bands. In the final analysis we may find FM giving service to metropolitan areas,

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Acceleration and Velocities of Rolling Bodies

W. W. SLEATOR

The H. M. Randall Laboratory of Physics University of Michigan, Ann Arbor, Mich.

IF A PLANE surface is inclined to the horizontal by an angle θ, and if a body could slide without friction down that plane, it would have an acceleration A which is $a/g \sin \theta$, where a/g is the acceleration of a freely falling body. It is one of the fundamental theorems about rolling motion that if (1) a thin circular ring or hollow cylinder, (2) a solid circular cylinder, and (3) a sphere, can roll without slipping down this incline, each has uniformly accelerated motion as a whole, and the accelerations are: (1) a (R) $= \frac{1}{2}$ A, (2) a (C) $= \frac{2}{3}$ A, and (3) a (S) $= 5/7$ A. If the distance that a body would slide without friction in a given time is D, then in the same time the rolling bodies lay off the distances (1) d (R) $= \frac{1}{2}$ D, (2) d (C) $= \frac{2}{3}$ D, and (3) d (S) $= 5/7$ D.

Also if these bodies move the same distance down the plane, all starting from rest, the velocities they acquire are different. Suppose that in going down a distance D the body that slides without friction acquires a velocity V. Since under these conditions $v^2 = 2$ a D, and D is the same for all,

$V = \sqrt{2AD}$, and

(1) v (R) $= \sqrt{2D \cdot \frac{1}{2} A} = 0.7071$ V,

(2) v (C) $= \sqrt{2D \cdot \frac{2}{3} A} = 0.8165$ V, and

(3) v (S) $= \sqrt{2D \cdot 5/7 A} = 0.8451$ V.

It is easy to check these values experimentally, and with considerable precision, even in a lecture. One needs first an unwarped board 1 ft. or more wide and some 6 ft. long, having near the edge of one flat surface a shallow groove an inch or two wide, in which the sphere can roll without interfering with the ring or cylinder. Rest one end of the board on a block or a horizontal rod, so that the starting line, drawn square across the surface, is horizontal, and at an elevation h, 8 inches or so, above the lower edge where the bodies leave the board. Mark other lines across the board, at distances from the starting line equal to (1) $\frac{1}{2}$, (2) $\frac{2}{3}$, and (3) $5/7$ of the distances to the lower edge. These distances are then (1) $\frac{1}{2}$D, (2) $\frac{2}{3}$D and (3) $5/7$D. Set a short block on the board at each line, the $5/7$ line being across the groove. Hold a square stick across the board at the starting line, rest the three bodies against this stick, with the ring, of course, in line with

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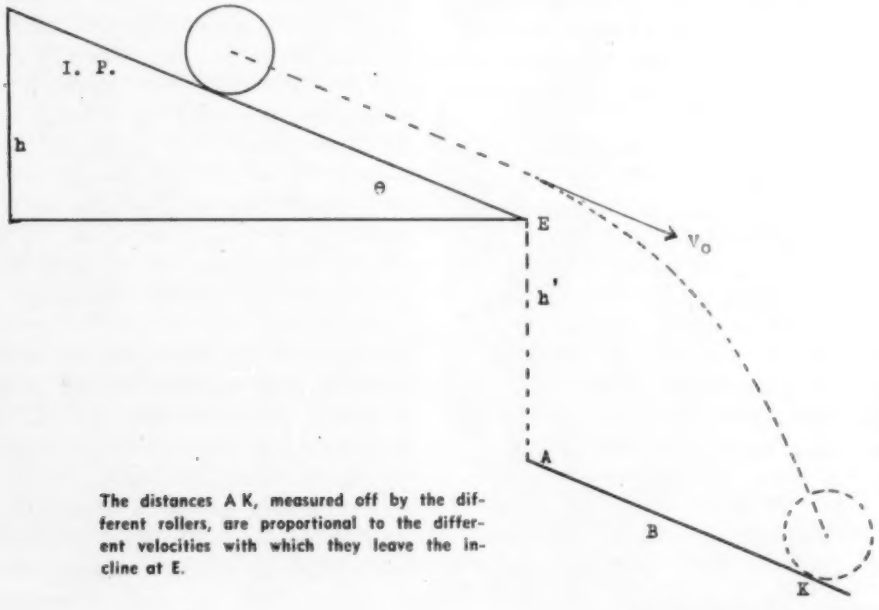

The distances A K, measured off by the different rollers, are proportional to the different velocities with which they leave the incline at E.

Atomic Structure as an Approach to the Study of Chemistry

HAROLD WM. BAKER

James Ford Rhodes H. S. Cleveland, Ohio

FOR SEVERAL years there have been many attempts to change the approach to the study of chemistry. The trend has been away from the historical or traditional approaches. Since a minimum of knowledge of atomic structure is fundamental to all the work of the first year, some efforts have been made to approach the subject through comprehension of atomic structure.

It was in January of 1924 that there came into my classroom a group of students who constituted the first accelerated group in the Cleveland schools. They had been accelerated through junior high so as to enter the ninth grade a semester early. Thus they were willing to be experimental material, and they knew how to be intelligently inquiring. It had been the good fortune of the writer to know this group rather intimately for three years previous, and when their questions led naturally to a proposal of a different approach to chemistry, they were eager to cooperate. The success of the experiment was such that it led to adoption of the general technique, with subsequent experimental variations, which the writer has continued to use.

AFTER the routine of the first day or so is cared for, explain to the classes the general content of chemistry, and swing into the idea of elements and their representative atoms. How big is an atom? Take a small piece of chalk, representing a volume of approximately one milliliter. In a similar volume of air, or any other gas, there are approximately thirty billion billion molecules. Most of these molecules contain two atoms. The number written on the board, will give the class a slight grasp of the general idea that the atom is rather small. Other ways of driving home the concept of small size will be just as effective.

Next pick some familiar point in the neighborhood which is about a mile away, and ask them to draw an imaginary line from the classroom to that point. Stretch the arm in that direction; "Can you see a baseball or an orange in the middle of that line? Half way would be half a mile. Hardly." Let's magnify a hydrogen atom to that mile in diameter; the nucleus of the enlarged atom would still be smaller than a baseball. Now raise the hand slowly to the shoulder, emphasizing bending the line in the middle, so as to describe a semicircle. Rotate the arm a few degrees, and repeat; that describes a segment of a sphere like the section of an orange. Continue to complete the sphere. Now, somewhere on the surface of that sphere is the electron, like a marble wandering on the surface. More complex atoms have more particles, but have the same general amount of space, and a constant balance of charges between protons and electrons.

NEXT, explain the helium atom, bringing in the neutrons. Continue with the Bohr atomic diagrams, showing perhaps a dozen atoms. Have the class make their own patterns of all atoms through calcium, arranging them in proper columns as in the eight-column periodic table. Spend a few days, as necessary, to develop all the concepts involved, with emphasis on the fact that the outer electrons which enter into chemical action determine valence and the differing atomic nuclei may be considered as the determiners of chemical behavior. Meanwhile, drill on such a number of names and symbols as the instructor deems important. Point out that most of this first twenty elements, plus a few close family relatives, are the ones which are most sufficiently intelligent, isotopes may be used to explain the irregularity of A 40, K 39, Ca 40. There may be even a few really bright students who will inquire so that isobares are explained.

Here is an excellent time to emphasize that the students who learn to place the elements in their various columns will profit by this

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The Teaching of Scientific Attitude Through the Use of Optical and Other Illusions

HYMAN RUCHLIS

Lafayette High School — New York, New York

IN ADDITION to the constant stress upon upon scientific attitude which should be part of every good science lesson it is worthwhile to include in each grade of science a specific lesson or group of lessons which bring out unmistakably the importance of this method and its application. One very effective lesson of this type includes the use of illusions to bring home the necessity for care in observation, suspension of judgment while the facts are being gathered, and the importance of measurement. It might well be an introductory lesson to the science or to the particular unit under study. The following procedure has proven very effective in teaching scientific attitude in an introductory lesson of this type:

1. The class is shown a 300 cc Florence flask and a 250 cc cylindrical graduate (which appears to the eye to be much larger than the flask). Pupils are asked whether the water in the flask will fill the graduate one-quarter, half or three-quarters full. The apparently ridiculous suggestion is also made that the water might overflow. The class generally agrees on half full. When the experiment is actually tried the water flows over. Several repetitions are required to convince the class that it is so. The illusion is due to the fact that a sphere has the minimum cross-section and for the maximum volume.

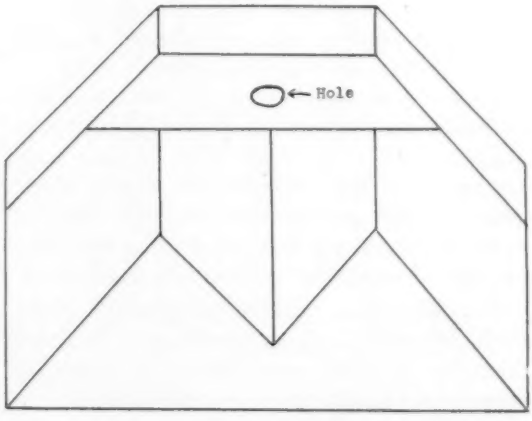
2. Now that their fingers have been burned the class has become cautious. A small brass ball is held up and compared with a large electric light bulb as to size and the class is asked which is heavier. Now that they are all wise the response is almost unanimous that the brass ball is heavier. A look of disappointment is quite evident on the teacher's face. His experiment is apparently a failure. In an obvious attempt to continue the experiment despite the quick-wittedness of the class the teacher asks several pupils to feel the weight and in all cases the weight of the ball is found to be heavier. The teacher constantly refers to the fact that although one would judge by size that the bulb is heavier it seems that the opposite is true. Pupils are asked to guess how many times as heavy the ball is. All sorts of conjectures up to 15 times as heavy will be given, although the average is two to three times.

AS A SORT of incidental checkup the teacher places the two on opposite sides of a platform balance the *the bulb is seen to be heavier.* The first reaction of the class is to suspect the accuracy of the balance but a reversal of the two objects and a verification with another balance convince them of their error.

This illusion is based on the fact that the pressure on the hand in the case of the brass ball is greater. Any two objects of greatly varying density may be chosen for this illusion.

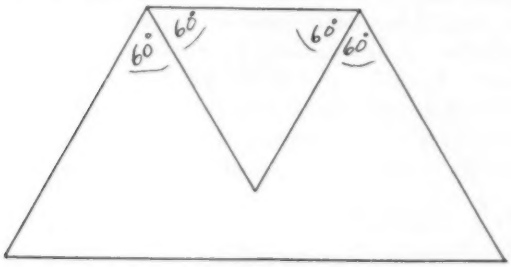
3. The apparatus shown in the diagram is shown to the class and they are asked what they see. They see nothing but a small table with a leg down the center and a hole in the top of the table. Apparently it is possible to see under and behind the table. A coin is dropped through the hole and it disappears from view. A ruler placed in the hole dis-

Arrangement of tables with mirrors to create an illusion.



appears and cannot be seen under the table. The class is mystified until the device is turned around and the mirrors which create the illusion are noted, with the ruler appearing behind the mirrors.

THIS illusion is based on the fact that if a mirror bisects the angle between two equal surfaces the image of one appears to overlap the second surface. The background should be of a uniform color and the lighting so arranged that shadow and light areas do not give away the existence of the mirrors.

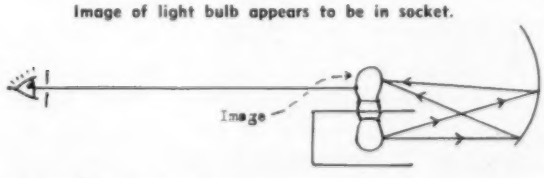


Mirrors are at 60 degree angle.

This illusion lends itself readily to auditorium use. A large model can be used to demonstrate a bodyless man.

4. A concave mirror (optically good) is placed in such a position that it reflects an inverted image of a carbon filament lamp in the exact position of an empty socket as shown in the diagram. A pupil is asked to look through a small hole in a piece of cardboard in a straight line with the empty socket and the concave mirror. The teacher points to the empty socket and asks the pupil to describe what he sees. The pupil confounds the class by declaring that he sees a lighted bulb. The teacher places his hand around the image of the bulb and the pupil declares that the teacher is holding the bulb in his hand. By means of a switch or button the teacher disconnects the bulb (inside the box and out of view of the class) and the pupil declares that the bulb has disappeared. All of which is very mystifying to the pupils in the class who see nothing but an empty socket all the time.

Image of light bulb appears to be in socket.



Care must be exercised in setting up the apparatus so the image of the bulb is exactly in the correct position. This may be done by locating the image on a piece of paper used as a screen and moving the mirror until the image is exactly in the socket. The box containing the bulb should be black inside and sufficiently wide (ten inches) to prevent the class noting that a bulb is inside the box. The mirror should be placed near a dark background.

AT THE conclusion of this series of four experiments the class is thoroughly convinced that it doesn't pay to be too careless in making snap judgments, and that once the judgment has been made it may still be incorrect. They can also see more clearly why objective measurement is important in searching for truth. Historical examples may then be cited to illustrate the point further.

One very recent and interesting example of a scientific error that is useful for class discussion is the case of the deer-bot fly that was reputed to fly 800 miles an hour. Popular magazines of a few years back may still be obtained which compare the speed of this amazing fly with bullets and airplanes. And yet the simple calculation of Langmuir showed that such a fly would require one-half horsepower, and would have to eat food equal to its own weight every second in order to achieve this speed. In addition, by simulating the size and color of the fly and whirling it around he made it disappear at 50 miles an hour when the original basis for the statement of the speed of the fly was the fact that it could only be seen as a brown streak.

There is one danger in this type of lesson that the teacher must avoid. The class may come out of the lesson feeling that nothing can be trusted and that complete skepticism is the only way of life. The teacher must therefore counterbalance the discussion of the need for care in observation with a discussion of the use of secondary sources of information and the nature of knowledge. If this is done the lesson will serve its purpose very well and the class will have deeper insight into the process of interpretation of what our senses tell us and the possible errors that might be encountered.

Medical Care

DR. JOHN PETERS

Concluded from December issue

Distribution Unequal

FAILURE of our system to meet present needs has been pointedly illustrated in the present war. Enormous numbers of the population have been torn from their normal environments. Large industrial towns have grown up in previously rural areas, without either physicians or medical facilities. Other rural areas have been stripped of physicians. The present system of competitive private practice cannot cope with such a situation because it imposes insuperable barriers to evolution and adaptation. If medicine had been organized in a coordinated manner before the war these problems could have been solved.

The organized medical profession should have seized this opportunity to launch experiments, to find solutions. Actually, when any program to extend medical care is contemplated, the chief efforts of medicine's most audible spokesmen are devoted to the preservation of the present system of competitive private practice with payment of fee for each service rendered and free choice of physician. When the medical profession should be stressing quality of service, it is quibbling about methods of payment. Free experiment is stifled in the name of "free enterprise."

Throughout the last century medicine has been turning steadily from cure and alleviation to the prevention of illness and disability, but physicians have not supported this change of front. Preventive medicine cannot be promoted by a system of competitive private practice with payment by fee for each service rendered. Such a system implies that medical attention will be sought only when illness or disability is already flagrant. Because the medical profession has adhered to these principles, it has been robbed, one by one, of a number of its functions by public health services. Rightly, public health and medicine should be united in a common endeavor. Economy and efficiency cannot be advanced by the categorical treatment of disease.

THE PRINCIPLE of remuneration by fees for service is probably the most objectionable and obstructive feature of our present system of practice. It is incompatible with organized co-operative effort, which requires that remuneration be proportioned to the value of each individual to the organization. It does not permit allocation of work and responsibility in the best interests of the operative group as a whole or of its patients. It cannot provide for investigative activities nor for the education and development of young physicians. It is positively vicious when applied to a publicly supported system.

On the basis of equity, fee-for-service payment may be defended if the patient personally sustains the cost, because there is a reasonable bargaining relation between the patient who wishes to reduce expense and the physician who will profit by increasing it. If, however, the bills are paid by a third party—be it the government, philanthropy or a private insurance company—this bargaining relation no longer exists; it now becomes the common interest of both patient and physician to multiply services and costs.

ALTHOUGH most physicians and patients will not take advantage of this situation, fee-for-service payment under these conditions puts a premium on chicanery and connivance. It places unscrupulous patients and

physicians at an advantage, while the decent members of the profession are compelled to assume the unpleasant role of censors. It was for this reason abandoned by British physicians shortly after their system of health insurance was inaugurated. Recent revelations in an investigation of workmen's compensation in New York have revealed the viciousness of the principle as well as the inability or unwillingness of the medical profession to assume the distasteful task of abating among its members the nuisances that arise under a system of fee-for-service payment for publicly supported care.

License System at Fault

State licensure of physicians has been only one of the obstacles to reallocation of physicians to meet local civilian needs in this crisis. Vested interests of private practitioners and the fee-for-service method of payment have been equally insurmountable barriers. Physicians in critical areas cannot be blamed for preserving their precarious positions or objecting when they are asked to risk a transient prosperity. Competent physicians, well established, cannot be persuaded to move voluntarily if they must depend upon the chances of unregulated private practice without the facilities and contacts that will allow them to maintain their professional standards.

If medical care is to be given by groups organized about hospitals and medical centers, physicians should be paid on a salary basis. To suggest that physicians will not work as hard for salaries is a slur upon the profession. This is the elective method of remuneration in most walks of life. Salary payment does not eliminate emulation; it merely substitutes service for immediate cash returns as the motive for competition.

THE investigators and educators who are advancing the progress of medicine are chiefly full-time salaried w o r k e r s. They are not given to indolence, but they do require security. In most pursuits fee-for-service and commissions are the methods of payment reserved for salesmen whose returns can only be measured in cash.

Free choice of physician is a privilege that is more talked of than enjoyed by a large proportion of the population. Its fuller enjoyment would not benefit society unless there were some assurance that free choice meant intelligent choice—which it obviously cannot so long as patients have no adequate criterion to guide their selection.

Even the leaders of organized medicine, who are most ardent advocates of free choice, are unwilling to see it extended to unorthodox practitioners of the healing art. State licensure acts limit free choice. Hospital privileges and specialty boards limit free choice. In the best clinics and in certain hospitals like the Mayo Clinic free choice is almost eliminated. These limitations are imposed to assure quality of service. Further efforts in the same direction with the same motive should be encouraged. It will probably be impossible to prevent certain people from indulging their emotions and wasting their money on charlatans and shoddy medicine, but to abet these indulgences is bad policy.

Certainly no one should be permitted to waste public or trust funds in such indulgences. If the government or any other body is to meet the costs of medical care it must have the right to establish standards of qualification and to share in the selection of those who will administer the program. The medical profession should not contest this right, but should see that it is exercised in a spirit which would not cheapen medicine, but improve the quality of medical care.

Wagner Bill Faulty

The Wagner-Murray-Dingell bill proposes to extend the present social security provisions to include a larger proportion of the population and to offer broader benefits, including protection against the economic hazards of sickness and disability, and general medical care. Although this bill is faulty in many respects, its objectives are good. It was introduced in a spirit of good will and public service. Its introduction was aimed to meet the exegencies of the present crisis and to anticipate the rigors of the reconstruction period ahead. It belongs among those measures that are aimed to prevent recurrence of an economy of scarcity. It is full of compromises, many of them inserted to avoid objections which had been advanced against the previous bill and to placate those

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Science in Soviet Russia

DR. MERVIN E. OAKES

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Dr. Oakes is to be congratulated on his thorogoing search for science literature on Soviet Russia. Tho he submits this annotated bibliography as a preliminary report, it represents the results of extensive search and careful study.

It is interesting to note that most of these references, in fact all those of American or English sources, are publications of the past few years. That American people of science by and large have until recently been kept in the dark with regard to development of pure and applied science in Soviet Russia is further evidenced by their voracious appetite for more and more information about its progress.

This intense interest in Soviet science is a healthy symptom. The strides made within a generation ushered in by the widespread illiteracy and backwardness of old Russia staggers the imagination. To us who have great faith in the possibilities of America's traditions of enterprise and organization, this serves as a challenge and a stimulus to strive for ever greater science achievement in America. Joseph Singerman.

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Science Clubs at Work

Edited by DR. ANNA A. SCHNIEB
State Teachers College
Richmond, Kentucky

• A department devoted to the recognition of the splendid work being done by the science club members and their sponsors in the various State Junior Academies of Science. Material for this department, such as student made projects; demonstrations and posters; outstanding club programs; state and regional meeting announcements; should be sent to Dr. Schnieb.

The Ferreters Initiate

LOIS BEAN, Club Member
Chester High School
Chester, Illinois

EACH year the Ferreters get off to a good start by having an initiation for the new members. The old members look forward with great anticipation to the initiation because it is a day of fun for all.

The purpose of initiations is to invest a person in an organization or society and to give him a particular function or status. Following up this idea our Ferreters Club has two initiations—the informal and the formal. The informal initiation takes place during the day. The old members have the privilege of deciding what the new members must do. Everyone in school gets a kick out of the initiation because the new members wear funny clothes, and there are quite a few "accidents." The new members might also carry an egg in a bucket and recite technical biological terms when commanded.

The formal initiation is held in the evening. This is a very pretty, solemn ceremony, which was first adopted by Mrs. Audry Hill Lindsey, now a critic at S. I. N. U., Carbondale, who organized the Ferreters eight years ago.

THE NEW members learn the purpose of the club, which is to foster the best interest of science, develop the true scientific spirit, maintain an active curiosity to seek the truth, and to strive to improve accuracy, neatness, carefulness, and patience. They learn the Ferreters' Creed, which is based on the purpose of the organization, and also why the club is called the Ferreters.

The club was named for the ferret, which is a very persistent and industrious little animal. He is always hunting and never gives up until he catches his prey. His name has come to mean "to search perseveringly for", therefore the Ferreters was chosen as the club name.

After the formal initiation a short program is given. Refreshments are served, and often

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The initiation is staged with an impressive ceremony.

A Study of Luminescent Wood

EDWIN WHITE, JR.

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ON FEBRUARY 9, 1944, a chemistry student brought some of this luminescent wood to school and showed it to the class. This wood was part of an old oak stump. Interest was aroused, and shortly afterward four of us took a field trip to see the wood in its natural habitat. We also saw a water trough made from a hollow gum tree trunk. This trough was glowing brightly. The chips from the trunk also glowed with considerable brightness. These luminous objects fascinated us. Again on April 7 on another field trip we saw the same stump glowing more brilliantly than before. (And, I hasten to add, the stump served as our main source of samples.) By that first trip our enthusiasm was increased and we decided to determine the effect of certain physical and chemical factors on the intensity of the luminescence; to attempt to grow the organisms which produce the luminescence on artificial media, and to find by observation what type of woods glow.

Our information on what has been done experimentally with luminescent wood is limited because we do not have access to a library which affords many scientific materials. It is very likely that the experiments about which I will tell you later have been done before and perfected many years ago, but due to our limited data and as we *did* want to know the cause of luminescene in wood and the factors that influence it, the experiments were performed.

FROM THE few available references, we learned that Boyle, as early as 1667, by means of a modified Von Guericke air pump, discovered that air or oxygen is necessary for the luminescence of bacteria. Following this discovery, Spallanzani, in 1796, indicated that bioluminescence was an oxidative process and required water.

From encyclopedias in the school library, we found that the luminosity of wood was due to bacteria or to a fungus growth such as Armillaria mellea, a mushroom. The mycelium of the mushroom, which infects the trees, is said to glow. A brief search was made through *Chemical Abstracts* from 1931 to 1943, inclusive, made available by The Magnolia Petroleum Company of Beaumont. Little was found relating to the bioluminescence of wood. From the 1938 *Annual Report of the Smithsonian Institution* in the article "The Biology of Light Production in Arthopods" by Maluf we found that material produced by the luminescent bacteria or fungi consisted of two substances. One, luciferin, is a substance which, when oxidized in the presence of luciferase, the other substance, will give off light which is perceptible in a dark room. "The luciferase is not merely a catalyst in the reaction but evidently supplies molecules which may be excited to emit light by the energy released upon the oxidation of luciferin."

Procedure

SINCE the references stated that either bacteria or fungus growth was responsible for the luminescence, we attempted to grow the bacteria or fungus on artificial media. A standard medium was made with 500 cc. of distilled water, 7½ g. of agar, 2½ g. of beef extract, 2½ g. of peptone, a protein material, and 3½ g. of salt. Two plates were poured and thin strips of glowing wood placed on the new agar. These were observed daily for bacterial growth and mold.

A second medium consisting only of a 0.25 M dextrose in 1.75 percent sodium chloride solution was used because Claren stated that this medium was best for the growth of luminescent bacteria. Each of six sterile test tubes containing the dextrose-sodium chloride mixture, which was a liquid, was inoculated with 0.10 g. of glowing wood pulp. Three of the samples were kept in the light and three in the dark with both at room temperature (68°—80° F. or 20°—27° C.). To the remainder of the dextrose-sodium chloride solution 2½ grams of agar were added. Slants were poured from this and exposed to glowing wood. Two slants were kept in the light and two in the dark.

A THIRD medium was prepared, using the following: liquid from 250 g. of potato cubes steamed one hour in 500 cc. of distilled water, 1.0 per cent detrose, 1.5 per cent agar, and 1.5 per cent sodium chloride. This mixture was heated until the agar dissolved, made up to 500 cc. with distilled water, tubed, and sterilized. Slants were inoculated with molds from the previous dextrose-salt slants and from the standard agar plates. This medium was tried because Jordan gave it as a good food for molds.

In addition to these experiments dealing with growing the organisms which produce the luminescence, we carried out many experiments on the effects of light and moisture on the length of time the wood will glow. At the beginning of the experiments all of the specimens luminesced in approximately the same degree. The samples were:

1. Those kept damp with distilled water in the dark.
2. Those with no water in the dark.
3. Those kept damp with distilled water in the light.
4. Those with no water in the light.

The last two samples were exposed to water vapor in the air and other weather factors. These specimens were observed each day.

TO TEST the effect of temperature above 25° C., a box of asbestos was constructed. This box, however simple, was made so as to regulate or rather maintain constant temperature. A small hole was cut through the bottom of the box so as to afford better ventilation and the whole apparatus suspended about 1½ feet over a Bunsen burner. Six samples approximately of the same brightness were used with two as controls at 26° C. The others were exposed in the box for periods of five minutes at five degree intervals from 30° C. to 70° C. In another experiment four samples were used, one at room temperature (25°) and the three other specimens subjected to these same temperature changes. After each heating, the samples were checked with the control for brightness.

The effect of low temperatures on luminescent wood was tested also. Samples of the same strength were procured. Each sample in a glass vial was put into the freezing unit and thus kept at the same temperature (4° C.). The time element varied from one minute to forty-eight hours. Each was warmed afterwards by holding the sample in the hands. The brightness was observed before and after warming.

ANOTHER part of the problem was to determine the effect of certain chemicals on the luminescent wood. Taking two samples of equal brightness, so far as the eye could judge, observations were made of the effects of natural gas, carbon dioxide, nitrogen, and oxygen on the intensity of the glow.

From "The Biology of Light Production in Arthropods" we noted that "alkali, within limits, favors the oxidation of luciferin to oxyluciferin (by luciferase) with the resultant production of light and that acid favors the reduction of oxyluciferin to luciferin with the consequent decrease in glow." Although we did not have a luciferin luciferase solution, we decided to determine the results of light production of wood samples in the presence of alkalis and various other chemicals, as follows:

1. sodium bicarbonate of different concentration,
2. ammonium hydroxide,
3. hydrochloric acid of different concentrations,
4. pepsin,
5. three per cent hydrogen peroxide solution,
6. chlorine water

In each case, a few cubic centimeters of the solution was added to a sample of wood, with another piece acting as a control.

All of these experiments were carried out with wood from a sweet gum tree. In an effort to learn what types of wood glow, one of the students made several trips to a section of cut-over land about ten miles from Sour Lake, in the extreme southeastern edge of Big Thicket. Stumps were cut open and the wood examined later for luminescence.

Results

The results of the attempts to grow either the luminous bacteria or the fungus on standard agar medium were negligible. That is, we have not yet obtained success in this field. The mold and the bacteria which grew do not

glow visibly. The results of the dextrose-sodium chloride slants and the potato slants were the same, with none of the mold or the bacteria glowing, although the mold grew extraordinarily well on the latter. Two of the molds appear to be of the genera Mucor and Penicillium. The bacteria have not been classified. One may be an Erythrobacillus, as it has the typical red color in colonies.

ONE particularly interesting observation was noticed in the liquid dextrose-salt medium. When the specimens were inserted, the liquid covered them and they did not glow; but after eight days, the samples again luminesced. The glow lasted for six days and then stopped. The samples became surrounded by mold.

In the experiments dealing with the effect of light and moisture, the samples kept damp in the light glowed for 22 days and those in the dark glowed 22 days. The samples with no water remained glowing for 5 days in the dark and for three days in the light. The dry samples, upon being moistened again on the ninth day, glowed.

Our experiments concerning the effect of heat on the luminescence of wood produced some definite results. Testing at temperatures ranging from 30°-70° C., we found that from 40°-50° C. the luminescence became brighter; above 50° the samples glowed a lesser amount; at 55°-60° C. all luminescence ceased. Upon cooling, some of the samples glowed and others did not.

WHEN the wood was subjected to low temperature (-4° C.), we found that one minute exposure reduced the production of light, with the sample glowing normally after warming it thirty seconds in the hand. Increasing the time of exposure also increased the time required for the sample to return to its former brightness. At 24 and 48 hour periods all glow ceased, and the wood would never again glow.

The results of the various chemical factors on the luminescence of the wood were interesting. Using 0.04 N, 1.0 N, and 2.0 N sodium bicarbonate favored the production of light, as did very dilute ammonium hydroxide. Hydrochloric acid as dilute as 0.1 made the glow stop. Hydrogen peroxide caused no visible change. Chlorine water stopped the glow, as was expected from the fact that our first samples when wet with tap water lost their luminescence. This tap water is purified with chlorine.

Nitrogen, carbon dioxide, and natural gas made the luminescence cease so long as the wood was kept in their presence, but when the samples were brought out into the air again, the glowing was renewed. Oxygen had no visible effect on the production of light.

Finally, the examination of stumps and decaying trees showed that pin oak, red oak, magnolia, and sweet gum are some of the woods that will glow. No doubt this list will be extended in the future.

Summary

WE REALIZE that the above results may not be reliable or accurate. One of the important reasons for this is that there are too many variables. First, the intensity of the glow was judged by the eye, whereas a photoelectric cell would give accurate measurements. Second, the samples used in the experiments were not of the same size, exactly, though efforts were made to keep them within 0.10 g of each other. The wood may also have been in different stages of decay. Nevertheless, we feel that we have learned some worthwhile facts in a few of the tests. In the future experiments, we shall attempt to reduce the variables, thus enabling accurate results.

The results of several of our experiments have been confirmations of work done by investigators studying the luminescent material of fireflies. For example:

1. Water and oxygen are required by the material in order for it to give luminescence. This has been known for nearly 200 years.

2. Methane, nitrogen, and carbon dioxide prevent the luminescence of wood as they do the extract of luciferin-luciferase of arthropods.

3. Temperature has a very definite effect on wood as on the extract from fireflies. High temperatures (above 60° C.) and, also, low tmperatures decrease the luminescence temporarily or for as long as the wood is exposed to the changes.

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MILITARY HYGIENE

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society, you will have to work at the job of preserving mental health. Perhaps the following suggestions will help you in this important job of self-conditioning:

Obviously your opportunity to select your own associates will be more limited than it has been in your civilian life. You will be forced to rub elbows twenty-four hours a day with every conceivable type of personality. If you allow it, your peace of mind can be destroyed by some of these contacts. The best plan is to accept those comrades as they are and not as you wish they were. Look for their good traits and try to ignore the others.

EVERY war gives ample opportunity for many small minds to become very arbitrary. You may find such an instance among your immediate "superiors". This is only one of the circumstances that can make the going pretty hard at times. Take it and come back for more. Avoid bitterness and cynicism. Above all things, face the facts honestly and don't rationalize your own position. Remember that "wherever human life is at stake, discipline is necessary". Before you become resentful of the orders or manners of one placed in authority over you, be sure that your own attitudes and performance are above reproach. But if it should be your misfortune to meet such a petty tyrant, your own interests will be best served by taking as much of it as possible before making an issue of it. Be sure you are right and know all the facts before taking the latter course. In our armed forces the commander who "throws his authority around" unnecessarily is usually reduced in rank.

This brings us to the importance of a sense of humor as a preventive of overrating our own troubles. I have seen many trying situations saved by the average American's irrepressible capacity for seeing the funny side of things.

Perhaps the most effective thing you can do to keep yourself well-balanced is to get the habit of thinking of the other fellow and rendering unselfish help to your companions. This is the foundation of real comradeship and is what builds morale in an 'outfit'.

THE MOST tragic thing that war engenders is its aftermath of hatred. Hatred and a desire for revenge are destructive emotions. To be an efficient soldier or sailor you don't have to hate your enemy. Rear Admiral Ralston S. Holmes, until recently commander of the Eleventh Naval District, said: "Hate is a blinding emotion we can ill afford in our need for coolly planned destruction of things we abhor."

It is hard to compute the effect on the personalities of young men of the necessary training for bayonet and commando fighting. It would seem that the only possible sanity insurance in the face of such preparation is to keep constantly in mind why we are fighting and what kind of a post-war world we want. Since mental health is largely a matter of motives and emotions, know all you can about the roots and causes of this war and the aspirations of all people of good will for the future. If the post-war world is not again to be the graveyard of the hopes of those who suffer through the war, all of us must not only be mastering the skills of war but planning for our own contributions to the peace that will follow. Just as the surgeon early learns to steel himself against the sufferings of his patient in order to focus his skill on attaining an ultimate good, so many of you will have to toughen your "innards" against the brutalities of a war that no one of us wanted.

For those of you who will actually experience combat duty, *fear* will unquestionably be the greatest hazard to your mental stability. In the January, 1943, issue of the *Infantry Journal,* this problem is superlatively treated by a committee of the Government's National Research Council, under the caption, *Psychology for the Fighting Man.* We recommend this article as 'must' reading for every service man.

Fear is the response of every normal man to the presence of known danger. Its physiological effect is to prepare the body for maximum activity. So long as fear does not progress to the point of panic, it actually increases physical efficiency. The problem, then, is one of keeping this powerful emotion under control.

WHAT can you do to keep this normal emotional reaction your ally, rather than let

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GARDENING

Continued from page 19

graphed. Teachers will be able to find many ways to stimulate interest, through charts, posters, contests, etc., if that seems necessary.

An enrollment fee sufficient to cover all or part of the cost of the seeds and other supplies which may be furnished (such as fertilizer, plants, etc.) will be found to be psychologically sound, as well as a means of financing the supplies.

Instruction. Science class time is the place for gardening instruction. Gardening is science applied in a way the youngster can understand and enjoy. Minimum essentials that should be taught are laying out the garden according to plan, preparing the soil, planting, various aspects of care such as thinning, weeding, cultivating, pruning, staking, etc., control of insect pests, harvesting. These are the points covered in *Elementary Garden-Graph* lessons, and they are presented so that any well-informed teacher can use them. Soils, fertilizers, lawns, shrubs and trees, and home yard layouts are also covered in *Advanced Garden-Graphs*, which makes possible more comprehensive garden instruction in the junior high grades, if desired. Advanced food garden plans are also given, for these older pupils.

The various knowledges and skills should be taught as close as possible in point of time, to the time the youngsters will need to use them in their gardening work.

Supervision. This is an absolute necessity for the success of any Victory Gardening program with children. Two home visits from the teacher during the summer will be found very effective. Visits from lay people, as volunteers, are better than none, but if used, such people should be kept in touch with the program and the pupils from the beginning, so they will not be strangers when they call at the children's homes.

Some extra compensation should be provided for teachers who do this work during the summer. It need not be expensive, for in ordinary city or village communities it should be possible to visit from 15 to 25 pupils per day.

However it is arranged for, supervision is a *must* in any school gardening program which aims to be something more than a gesture. Gardens and garden programs which fizzle out in mid-season do not produce food nor do they teach boys and girls desirable traits of character.

Finishing the Season. Every program which has a beginning should have a definite and satisfying conclusion. This may mean a Garden Harvest Show in September, with appropriate ribbon awards. It should certainly mean certificates or badges, reasonably attractive and impressive, awarded with due ceremony to all those who stick through and do the gardening job to the best of their ability. This is far preferable to a few fine prizes for the outstanding.

A Calendar for School Victory Garden Programs

To clarify the seasonal sequence of the sort of program outlined, here is a brief calendar for the year.

December and January—Plan the program.

February—Get the needed text material, enrollment cards, information and promotion circulars, etc.

March—Enroll the children; provide for the needed seeds, plants, fertilizer, etc.

April—Teach the essential techniques of garden layout, soil preparation, and planting. Distribute seeds at planting time.

May and June—Continue instruction as needed, covering techniques of garden care, pest control, harvesting, etc. Visit gardeners at their homes to encourage, correct, and evaluate.

July—Make home visits not made in May or June. Hold a community picnic or other morale builder if it seems desirable.

August—Second home visits to gardens for final evaluation.

September—Victory Garden Harvest Shows.

October and November—Concluding ceremonies with awards to the "finishers".

For The Science Teacher we want activity material. Write us about any demonstration, project, club program, club building and financing methods, new unit of instruction, etc. that you have found successful.

MEDICAL CARE

Continued from page 27

who had raised these objections—especially organized medicine.

THE administrative machinery proposed in the Wagner-Murray-Dingell Bill may be faulty. But there may be hope of correcting these faults, if objections are raised in a constructive spirit. Physicians must not expect a public project to be committed to their unbridled control. They should be willing to concede to consumers their rightful prerogatives. They should welcome participation of other indispensible professional groups. In return they should be granted administrative responsibility in fields in which they are expert.

Taxes Distribute Costs

Taxation would seem more equitable than contributory insurance to meet the cost of a program designed for a large proportion of the population. No one with any actuarial knowledge believes that voluntary private insurance is applicable to more than a narrow stratum of the population. And this particular stratum is not in greatest need of aid. Voluntary insurance is, furthermore, unduly costly because it tends to accumulate bad risks and it requires machinery for solicitation, advertisement and collections. The care of the sick, like education, must ultimately be an inescapable public responsibility. If we do not pay for the care of disease, we must pay for its consequences.

The Wagner Bill, however, vests no control over medical education in any Federal health authority. It establishes a fund from which grants may be made by the Surgeon General of the Public Health Service for the promotion of research and education to institutions which apply for these grants in aid and present programs to the Medical Advisory Committee provided by the Bill. No institution is required to apply or to qualify for a grant; none need adopt a program foreign to its interests.

This is no new adventure. Already we have a National Health Institute; Child Welfare, Maternity, and Public Health services; and an Anti-Syphilis educational program. They have done noble work and have granted as great or greater freedom for experiment than can be enjoyed under the restrictions imposed by most philanthropic foundations.

CERTAINLY if the government contemplates the institution of a public system of medical care is should provide for the improvement of the quality of this care through education and investigation. In addition, however, capital funds should be made available to create new medical facilities, including hospitals and health centers, where they may be required.

The worst features of the Wagner-Murray-Dingell bill are: the inclusion of fee-for-services among its methods of remunerating physicians; the looseness of its provisions for hospital care; its failure to promote the organization of medicine about hospitals and health centers.

SOME action is urgent to meet the immediate critical needs and to prepare for those to come. It is urgent that the nation get the medical care it requires and that the coming generation of physicians be enabled to enjoy a fuller professional life and growth, that medicine be restored to its full dimensions, not reduced solely to the function of distribution.

Physicians should use this opportunity to recover some of their lost prerogatives, to bring investigation and research again into their domain, to participate with, perhaps ultimately to absorb, public health. They should welcome assistance and strive for partnership with social agencies and allied professions without which they cannot function in a broad sense, not jealously insist that the whole province of medical care is their private possession. Most of all they should welcome and encourage free experimentation in the distribution of medicine, not strangle it with inhibitory conditions.

The best of the medical profession would be more likely to respond in this manner if consumers evinced more concern in investigating and promoting improvement in the qaulity of medical care instead of confining all their interest to methods of distribution and reduction of costs.

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ATOMIC STRUCTURE

Continued from page 23

knowledge in that the family resemblances of elements appear by columns. Thus if a student becomes familiar with one element in a column, he can assume that the other elements in that column will have similar chemical properties. This permits early use of the 18-column table, when desired.

From the general relationships of chemical properties, it is easy for the teacher to develop the idea of the metallic elements as contrasted with the acid-forming group of the upper right hand corner. Of course it is assumed that this classwork is paralleled by demonstration and laboratory work, and interspersed with adequate explanation of such new terms as need to be defined and applied.

As a consequence, it is assumed that by this time the class will understand the meaning of these terms: elements, compounds, mixtures, atom, molecule, chemical change, electron, nucleus, ion, symbol, formula, acid, base, salt, oxide catalyst, valence, atomic and molecular weight.

THE TEACHER may progress from here in any of several directions. The writer has found by experiment that it is very profitable to work into the naming of oxides and other binary compounds. Such drill naturally fastens the naming of plus ions of different valence. By the use of any technique of learning nomenclature (the writer uses seven key acids, from which most formulas may be inferred), the classes are then ready to apply solubility rules and go directly into work on simple equations.

In any case, work on atomic and molecular weight can be brought in to enliven the formula and equation drill, and this leads naturally to applications of various types of problems, including the three principal gas laws. Experiments on oxygen and hydrogen, solution, and quantitative relationships all fit smoothly into such a program.

By mid-semester a good class will be writing equations and doing problems on weight and volume. The various reactions related to nitrogen compounds offer excellent opportu-

Continued on page 45

FILMS ON SOVIET SCIENCE AND MEDICINE

TO MEET a widespread curiosity about achievements in Soviet science, there is now available by rental thru Brandon Films, 1600 Broadway, New York 19, N. Y., a number of sound films suitable for the junior and senior high school levels. A teacher guide supplied with some of these films is an aid to the teacher in making the best possible use of them. The guide summarizes the content, supplies additional pertinent facts where children are likely to ask questions, and suggests possible lines of pupil activity, even making occasional suggestions. Except where otherwise indicated, commentaries are written and spoken by Professor J. B. S. Haldane.

A ten minute reel, which combines *Respiration and Blood* and *The fight against Shock*, suitable for the junior high level, includes an unusual view of the heart of a living man. Relief of severe shock by injection of salts into the cerebro-spinal fluid, a Soviet development, is explained and graphically illustrated.

Glimpses of Soviet Science, a fifteen minute reel, comprises an unusual collection of short subjects in various fields of science and invention. It is not aimed to meet the need of the teacher seeking a reel of conventional pattern to fit into a particular niche in the syllabus. For the teacher who wants something different, who wishes to show a film that will encourage further inquiry and study and motivate pupil activity, this unusual reel has much to offer. You will see how a parent bird feeds an artificial nestling with which the Soviet school children have replaced the baby birds. Your youngsters will want to repeat these experiments to study birds' feeding habits, and possibly maternal instincts too. More advanced students can be encouraged to build their own metalizer, or to produce corundum in a homemade furnace. Some children would want to carry out strain tests on structural models. Other subjects in this reel illustrate surface tension, a new high-speed passenger boat, a hydro-screen and the production of liquid air.

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The spectacular film, *Revival of Organisms*, which has received wide publicity in the press some months ago, and has now completed a tour of medical societies, is available for public and school distribution. The striking demonstration of the reflex actions in a severed head of a dog and the revival of a dead dog will stimulate constructive imagination, encourage further inquiry and study and arouse interest in biology. This film is appropriate in connection with the teaching of circulation and respiration.

Soviet Medicine at the Front, with commentary by Frederick March, written by Lillian Hellman, is an exciting 55 minute documentary on the organization of army medicine beginning with rescue of the wounded in the midst of battle and right on up thru various stages of first aid, emergency, surgical and rehabilitation treatment. Among snatches of surgical operations is one by the world famous Dr. Nikolai Budenko on a brain injury. J. S.

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FREQUENCY MODULATION

Continued from page 21

while the high powered — perhaps super-powered AM stations will serve the rural areas. In any event the change will be a gradual one and in the direction of better all around broadcast service for all the listeners. One must not neglect television in considering the future of radio broadcasting. That, however, is a topic of much too great a scope to be covered here.

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N. S. T. A. AT WORK

Continued from page 13

preliminary suggestions and help in the preparation of a report? If so, send a card to Mr. Nelson Beeler, Senior High School, Nyack, New York.

National Committees for Service Projects:

The National Science Teachers Association does not have sufficient financial resources to underwrite the expenses of numerous national committees. However, the officers and directors believe that financial support can be obtained from other sources whenever plans indicate that a constructive service could be performed were some additional funds available. We must have plans, and we must have a committee and a group of consultants all set to go.

SOME projects which have been proposed deal with areas such as the following: Science Teaching and International Relations, Bettering Intercultural Relations Through Science Studies, Conservation of Natural Resources, Science for Leisure Time Activities, Cultivating Scientific Talents, Opportunities for Science Education by Means of the Radio, Evaluating Visual and Auditory Aids Related to Science Instruction, The Science Library and How to Use It, Apparatus and Equipment for Science Teaching, Developing Critical Thinking Through Science Studies, Using Science in Developing a School Camp, Planning a Science Program for the First Twelve Years, Suggestions for Temperance Education, and several others.

Would you be willing to serve on a committee to make preliminary plans for a project related to any of these areas? Would you be willing to serve as a consultant to one or more committees?

Remember that an Association can grow in vigor and influence about to the extent that members give time, thought, and support to a constructive program of service projects. If you would be willing to help, please notify the national president of your interests.

ROLLING BODIES

Continued from page 22

the block at ½D. Release the rollers suddenly, by jerking away the stick. The three rollers will strike their blocks simultaneously, with a single satisfying crash. This demonstrates the relative accelerations, and the relative distances.

THE DIAGRAM in the accompanying figure shows how to demonstrate the relative velocities acquired by the rollers. I.P. is the inclined track, down which they roll, and they are to leave the plank at E, after which they move as free bodies through space, until they all strike on the board B, which is strictly parallel to I.P. The line A across B is exactly below the edge E, and AK is the distance down B to the striking point. This can conveniently be marked by placing two sheets of paper near K, with carbon paper between them, that each falling body will register its stopping point. Then the three distances AK can easily be measured. These distances are proportional to the velocities with which the bodies roll off at E, and therefore to the numbers $\sqrt{1/2}$, $\sqrt{2/3}$ $\sqrt{5/4}$. In fact the proportionality factor is $\sqrt{4hh'}$ where h is the elevation of the starting line above E, and h′ is the vertical distance E A. Accordingly, if it is not inconvenient, make h = 20 cms and h′ = 125 cms. Then $\sqrt{4hh'} = 100$, and the distances A K will be (1) 70.71 cms for the ring, (2) 81.65 cms for the cylinder, and (3) 84.51 cms for the sphere. Of course h and h′ may have any values so long as their product is 2500, for example 50 and 50, and the distances will be the same.

It is an interesting problem, but simple, to show that the time of free fall depends on h′ only, and is independent of the velocity (Vo) with which the body leaves the inclined plane at E, and to show that A K is in fact given by the expressions $\sqrt{4hh' \times 1/2}$, $\sqrt{4hh' \times 2/3}$, and $\sqrt{4hh' \times 5/7}$. It is plain that neither the mass nor the radius of the roller influences the acceleration, hence any ring (being relatively thin), any sphere, and any solid cylinder will serve. One could add to the interest, perhaps, by using a hollow sphere also, and then (4) a (H) = 3/5 A, etc.

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FERRETERS INITIATE

Continued from page 30

there is dancing in the high school gym.

Club secretaries and sponsors interested in having a copy of the formal initiation may obtain one by writing to:

Mrs. Mary Creager, Sponsor of the
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Chester, Illinois.

No sooner are the formalities of initiation finished than the Ferreters start on one of the major projects that help to fill a busy year.

THIS year we sent a duplicated science news letter to each of our former students now in the armed forces. The news letter contained the names and addresses of over three hundred soldiers, sailors, marines, merchant marines, and WAC's and a statement about them when these could be obtained. It required a lot of work collecting the information from friends and relatives, but we had fun doing it. Addressing and stamping all of the envelopes took time, but after some difficulties, we finally finished the job.

Individual and group projects are being made by club members. One of particular interest is a seed collection. The seeds are mounted in a seed board and can be classified by a key made by the students and following the general rules of an artificial key. Twenty-four common vegetable seeds are divided into three classes according to their shapes—round, oval, and otherwise. The third group has five divisions—disc shaped, kidney shaped, irregular, round-oval, and elongate. These main divisions are subdivided to lead to the identification of the seeds.

ALL OF THE club members have projects in various stages of completion. Many of these will be shown in the Junior Academy at the high school or at the meeting this year.

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LUMINESCENT WOOD

Continued from page 33

4. Certain chemical factors, as dilute bases and acids affect the luminescence of the luciferin-luciferase extract of fireflies.

These experiments are just a beginning of our investigations on luminescent wood. We intend to continue our experiments this summer. As is evident, the growth of the organisms which produce the luminous material still presents a problem, as we have only negative results at present. Perhaps by the time of the next Academy meeting we shall have a more promising report in this work.

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ATOMIC STRUCTURE

Continued from page 37

nities for this drill. By the time the class is ready to study sulfur and the halogens they will have covered practically all of the theory required for the whole year.

TO SUMMARIZE the technique briefly, it builds up the knowledge of chemistry in a logical expansion from an understanding of atomic structure. Any progressive teacher will continue to try modifications from time to time. If atomic structure is used first, followed by a development of understanding common terms and of periodic relationships, it is a simple matter to continue in almost any direction. The writer recommends that the next step be on formula and nomenclature drill, interspersing quantitative relationships

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We supply a list of new books and indicate the publishers. (Second semester.)

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(At the Baltimore meeting of the American Chemical Society in April of 1940, President-elect Lind spoke to the Chemical Education group, and begged for some modernizing revision of the traditional approach to chemistry, and he added a comment to the effect that he supposed someone would now come up and tell him of using an atomic structure approach for some years. We did.)

SCIENCE IN RUSSIA

Continued from page 29

Other titles in this same series of booklets: (Also 5¢, each.)

"Mineral Resources of the USSR."
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Books with considerable attention to science in Russia: (See index in each.)

The Scientific Attitude. C. H. Waddington. Penguin Books. 128 p. 1941. 25¢.

The Social Relations of Science. J. G. Crowther. Macmillan. 665 p. 1941. $3.50.

The Social Function of Science. J. D. Bernal. Macmillan. 482 p. 1939. $3.50.

Science and Social Needs. Julian Huxley. Harper. 287 p. 1935. $2.75.

The Marxist Philosophy and the Sciences. J. B. S. Haldane. Random House. 214 p.

Science and Human Life. J. B. S. Haldane. Harper. 1933. 287 p.

Each of these books deserves careful study by science teachers.

Other sources of information:

"Soviet Calendar, 1944." Foreign Languages Publishing House, Moscow.

A mine of information about Russia.

Information Bulletin of the Soviet Embassy, Washington, D. C. No charge. Often has articles on new scientific discoveries.

MILITARY HYGIENE

Continued from page 34

it become your enemy? Keep busy during the period of anxious anticipation. Activity lessens fear. If possible, keep in sight of other men. The companionship of others gives courage. Be informed about your approaching mission. The known is less fearful than the unknown. If you are in charge of others, keep the individual who is inclined to be panicky out of sight of the others. Panic is very contagious.

In your intelligent efforts to maintain mental and emotional balance through the period of stress that lies ahead of you, you can ill afford to neglect the resources of strength that lie in religious faith. I do not refer merely to the minor ritualistic and credal differences among us. These externals are the window dressings of religion. I do mean, among other things, that abiding faith in the ultimate triumph of right in the world, the supreme respect for the worth of human personality, and the willingness to put into practice the philosophy of the Golden Rule. Keep in touch with the chaplain of your religious preference. These spiritual leaders are carefully selected and well trained men. Their counsel and guidance can be a real pillar of support amidst the confused and confusing experiences of war.

A FEW months ago Dean Paul M. Pitman of San Jose State College addressed some reservists at that institution. In his remarks he aptly said that the war can do you a lot of good if you let it, and it can do you a lot of harm if you let it. Of course he was referring to the kind of character and personality that you will bring back to the arts of peace. We trust that the foregoing pages may be helpful to you in directing your thinking and decisions so that your military experience may be a beneficial rather than a disrupting interim in your life.

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Science Projects

In Biology, Chemistry and General Science

Biology Projects

(Published, October, 1942)

Included among these projects are: loss of soil elements by leaching, test tube plants and root hairs, food elements of plants, how to make a cross section of a stem, using light to make glucose and starch, when plants breathe like people, heat of respiration in plants, what causes liquids to flow in plants, identification of trees, the house fly and what he carries, controlling insect pests, digestion, checking your posture for health, charting your teeth, susceptibility to tooth decay, making media of correct pH to grow bacteria.

47 Projects, 100 pages, mimeograph $1.25

Chemistry Projects

(Revised, March, 1943)

In this group are found examination and purification of water; testing of lubricating oil, paint, baking powder, wool, silk, cotton, rayon and linen; electroplating; metal working; hydrogenation of oil; getting sugar from corn; tanning leather and fur; making bakelite, cold cream and vanishing cream, baking powder, mirrors, ink, polish, and plastic wood.

35 Projects, 125 pages, mimeograph $1.25

General Science Projects

(Published, October, 1942)

Among the projects are the following: amateur range finding, how to navigate by sun and stars, weighing without scales, making and using solutions, seven ways to start a fire, seven ways to put out a fire, chemical indicators, a rock mineral collection, a pin hole camera, printing pictures, learning to be a radio amateur, a pendulum project, testing foods at home, digesting food with saliva, canning food, how good are the arches in your feet, surveying the teeth, and clay modeling and casting.

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BOOK SHELF

EPILEPSY—THE GHOST IS OUT OF THE CLOSET, Herbert Yahraes. Public Affairs Committee, 30 Rockefeller Plaza, New York 20, N. Y.

This ten cent pamphlet makes a strong case for the epileptic with whom is undeservedly associated a feeling of repugnance on the part of the general public. It describes different types and degrees of this illness, possible causes, treatment and care of the patient, and includes a bibliography. Eighty per cent of epileptics are able, with few precautions, to lead normal lives. Treatment with newly developed dilantin sodium is very effective in reducing frequency of attacks. J. S.

AIR NAVIGATION—PART SEVEN. McGraw-Hill Book Co., New York, 1944. 198 pp. 21x28 cm. $2.00.

This number, dealing with nautical astronomy and celestial navigation, is on the same high level of production as the preceding numbers, all published under the supervision of the Aviation Training Division, Office of the Chief of Naval Operations, U. S. Navy. It includes the fixing of position by celestial sights, the nature of astronomical time, the determination of the time of rise or set of the moon or sun, and the location of the principal navigational stars. The book is replete with illustrations and tables. J. S.

THE LIVING WORLD (Student chart), Homer M. Hightower, Hammond City Schools, Hammond, Indiana. Published by the author, 1944. 8 pp. 28x19 cm. 10c.

The Living World unfolds into a chart that gives an over-all view of the plant and animal kingdom. It should prove of value to students in seeing relationships and knowing where to place an animal or plant in the animal or plant kingdom.

The chart folds to notebook size. A large wall chart 24x35 inches is also available for the teacher.

A GUIDE TO NAVAL AVIATION, Lts. Elton, Driscoll, Burchmore, and Larkum, USNR, Instructors, Naval Training School, Quoinset Point, R. I. McGraw-Hill Book Company, New York, 1944. 295 pp. 21x13 cm. 153 illus.

This book serves as a brief guide and elementary introduction to naval aviation for naval personnel or laymen who want to learn more of the background, organization, equipment, and operation of the U. S. Navy air force. It covers a number of areas including the theory of flight, types of naval aircraft, power plant, aircraft carrier, armament, bombs, air organization, air traffic control, and aerology.

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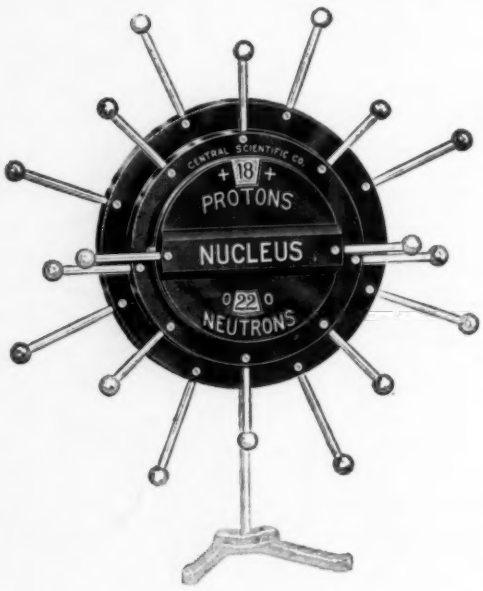

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